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Corrugated-Plastic Shelters for Growing Forest Tree Seedlings

by

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The shelter described here is intended to serve as a miniature pre-season greenhouse over nursery beds. It is a low profile structure that can be installed or removed with a minimum of effort. The purpose of such a shelter is to create optimum conditions for early germination and improved survival and growth of tree seedlings.

We have now completed an experimental design for such a shelter made from a new form of plastic material recently introduced to the Canadian market. It is manufactured from polypropylene/ethylene resins in extruded, translucent, corrugated sheets measuring 1.2 m x 2.4 m (4 ft x 8 ft). The non-pigmented plastic sheets are stabilized against the weakening effects of ultraviolet rays.

Essentially, the shelter was designed as a peaked roof structure with 30-cm (1-ft) high side walls, an overall height of 89 cm (35 inches) and a width sufficient to span a standard 112-cm (44-inch) wide nursery bed. Modules can be joined (see Fig. 3) to accommodate any given length in multiples of 1.2 m (4 ft). The structure is self-supporting and strong enough to withstand high winds; its light transmission capacity as estimated by the manufacturer is 75% and the protected seedlings are not subjected to sunburning. Under constant use and exposure the life expectancy of the material is estimated at 4 to 5 years.

As a result of field tests undertaken since this Note was prepared, some modifications are being made to the design. These principally involve simplification of the fastening systems to expedite setting up and dismantling of the shelters. In addition, ease of access has been improved.

Ontario Ministry of Natural Resources

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Minister

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A communication of the Forest Research Branch to aid management of Ontario's forest land resource. Further information may be obtained from: The Director, Forest Research Branch, Ministry of Natural Resources, Maple, Ontario. L0J 1E0

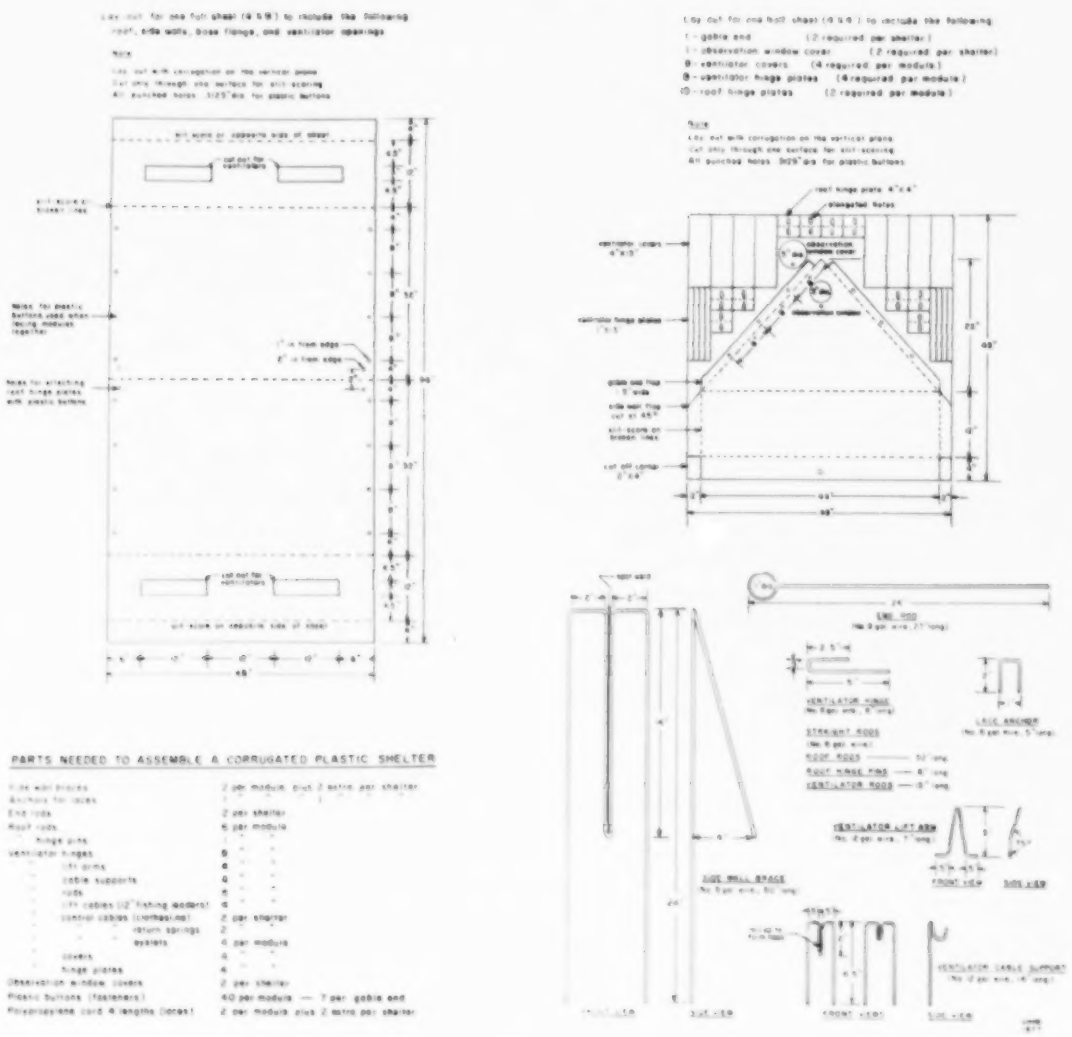

Figure 1 *A list of parts needed (lower left) and patterns for roof and walls (upper left), ends and plastic parts (upper right) and wire parts (lower right) to assemble a corrugated-plastic shelter.*

Patterns for the shelter parts are shown in Fig. 1. One sheet cut to specifications renders one module and the two gable ends are cut from another sheet with a minimum of waste. Specifically cut and formed galvanized wires (Nos. 8 and 12) are used for anchorage and attachment of various parts. The modules are tied together with laces (polypropylene cord) anchored at the peak with a "U"-shaped wire which is inserted into the flutes. The laces are then looped around plastic buttons down the roof and tied to the top of the side wall braces.

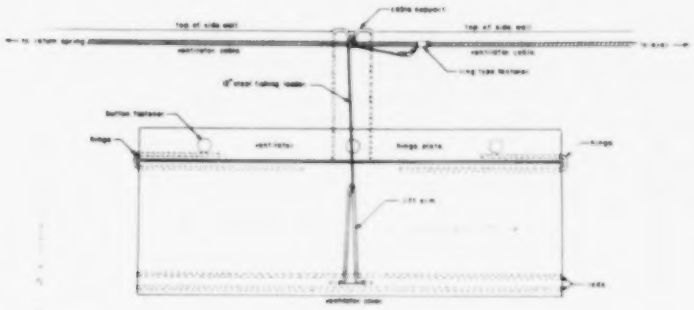

Figure 2 Details of ventilator assembly.

Silt-scoring, i.e. cutting through one surface of the corrugated sheets, produces roof sections that have all flutes in the corrugation open at the peak and the eaves. This allows free air passage through the roof, dissipating some of the heat generated by the sunload. Another advantage of the slit-score process is that moisture accumulated in the roof can flow down the flutes, continue through the side walls into the shelter and add humidity inside. Evaporation along the outside wall is reduced by a 10-cm (4-inch) wide flange incorporated along the base.

The ventilator system is operated by a cable (plastic-coated steel clothesline) that is moved horizontally along the eaves by means of a simple lever and return spring (Fig. 2). The ventilator covers are linked to the cable with nylon-coated steel fishing leaders which enables them to open or close when the lever is pulled or released.

To allow access into the shelter roof hinge pins are inserted into the modules at the peak, so that one side of a module can be lifted independently at a time.

Side wall braces are used to anchor the shelter to the ground and brace it against side sway from crosswinds. Additional stability may be obtained by covering the flange at the base of the shelter with soil. The ventilator cable along the eaves provides further stability, especially during windy periods while the ventilators are open.

When a shelter is dismantled it is recommended that the modules be stored flat on a pallet and covered to protect them from unnecessary exposure to ultraviolet rays.

Five shelters, each 30 m (100 ft) long, have been constructed by the Forest Research Branch at Maple, for field testing in 1977 at the following locations: Swastika Nursery, Orono Nursery, Kemptville Nursery and two at Maple. Also a shelter 150 m (500 ft) long was constructed at the Dryden Nursery where it will be installed.

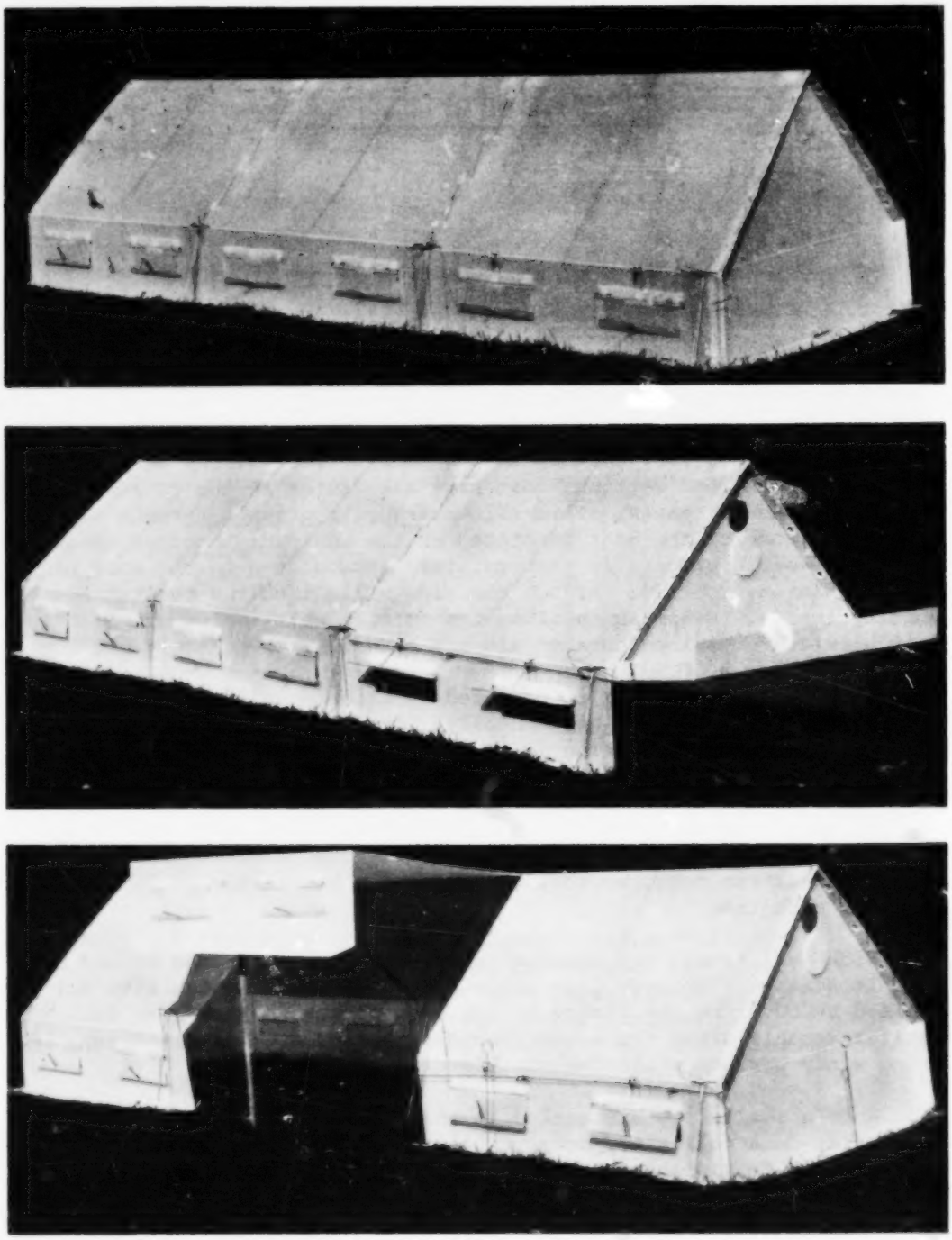

Figure 3 *A 3-module, corrugated-plastic shelter with (top) all ventilators closed, (middle) two ventilators and end flap open, and (bottom) one side of the central module raised for access to the inside of the shelter. (Photography by Miss J. Robinson.)*